



Human Effectiveness Directorate

Cockpit Resource Management (CRM) Training Research

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Introduction

- CRM training is required for all Air Force Aviators
- CRM addresses a set of “soft” skills (AFI 11-290)
 - Situational awareness - Crew coordination/
flight integrity
 - Communication decision making - Risk management/
 - Task management - Mission evaluation
- CRM training in the Air Force has traditionally focused on terms, definitions, and generic skills
- Little evidence that CRM training is effective



Background

- Naval Aviation Human Factors Working Group assessed CRM training in the Navy:
 - “program as currently structured is ineffective
 - » Single dimension
 - » Program not integrated into training continuum
 - » Transfer of skills not occurring”
- Naval Aviation Air Board committed \$48 million over 4 years to improve CRM training
- CRM training in the Air Force is no better, with the real need being to coordinate CRM across services



Research Objectives

- **Investigate the empirical links between CRM and mission performance**
- **Identify the CRM observable behaviors that are correlated with mission success**
- **Provide prescriptive guidance to the operational community to improve CRM training**

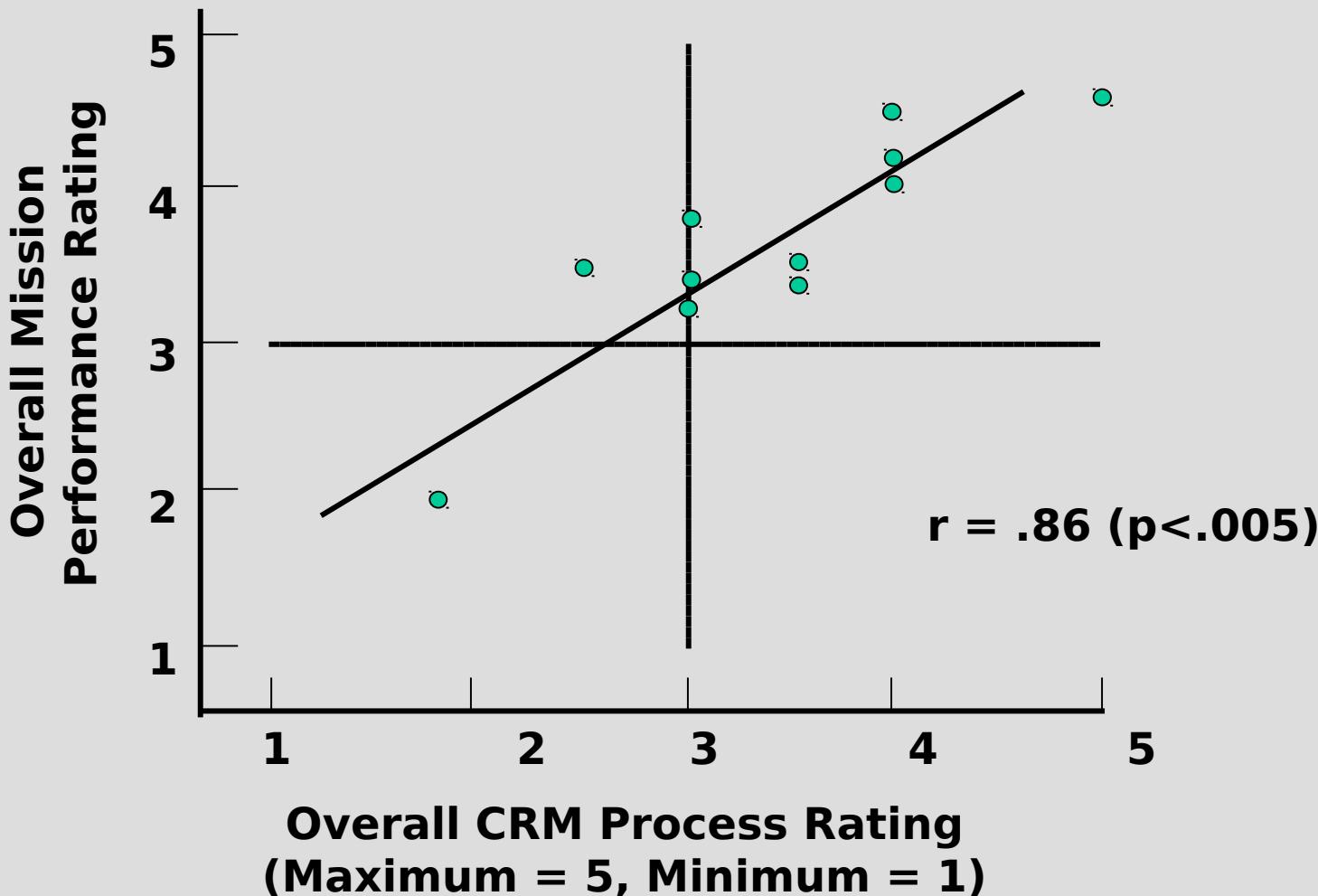


Basic Approach

- **MH-53J, MC-130P, and C-5A crews were observed as they planned and executed a mission during annual simulator training**
- **CRM behaviors rated by a SME during specific mission phases using behaviorally-anchored rating scales (BARS)**
- **Mission performance rated by a different SME for the same mission phases, again using BARS**
- **Overall CRM ratings were correlated with overall mission performance ratings**



MC-130P CRM Process and Mission Performance Relationship



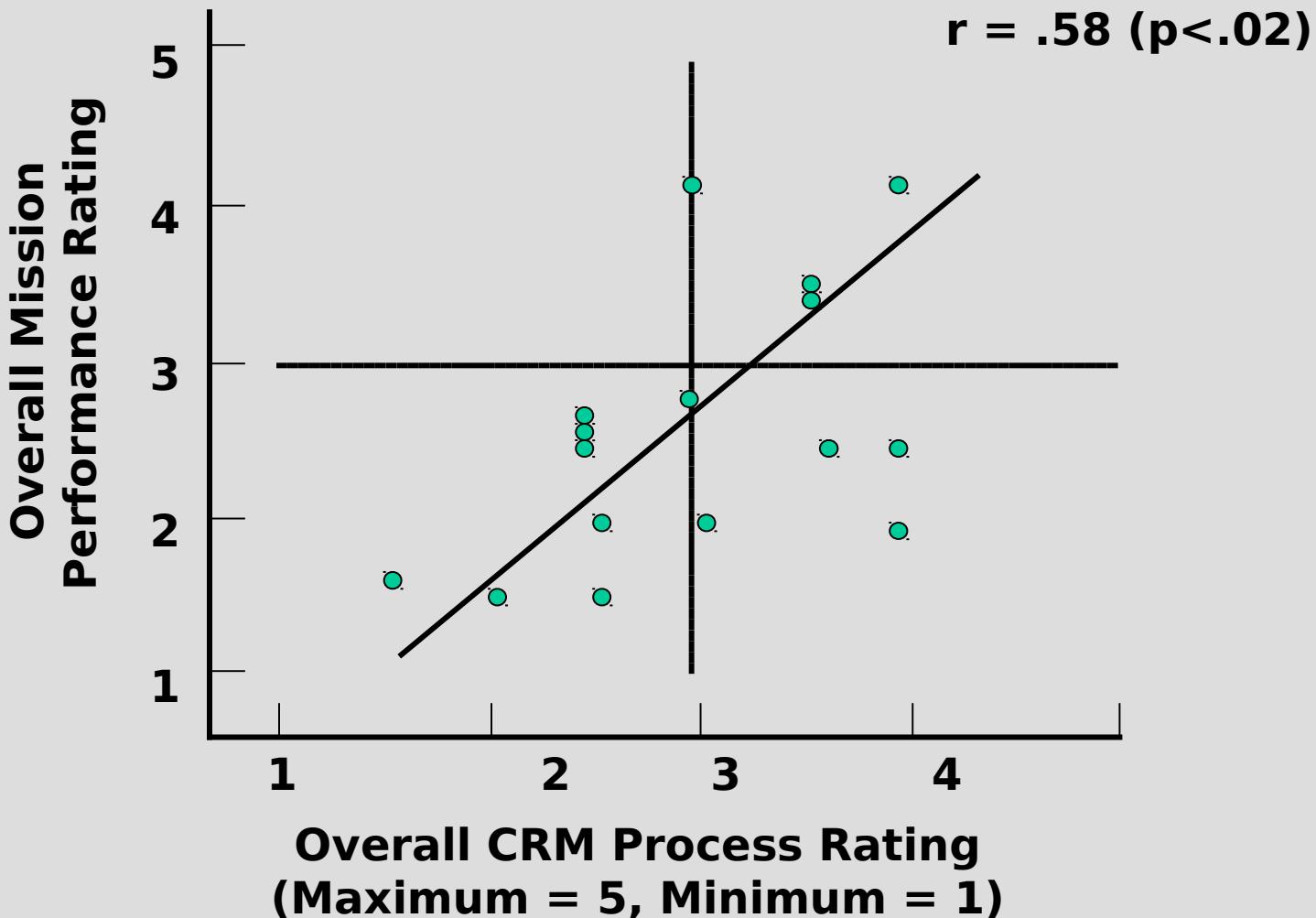


MC-130P Study Results

- **Each point represents one of 11 crews observed**
- **The dotted lines represent the minimum criterion for acceptable mission performance or CRM**
- **10 of 11 crews met or exceeded minimum mission performance levels, 9 of 11 met CRM minimums**
- **The crews given strong mission performance ratings also received the highest CRM ratings**
- **75% of variability in mission performance ratings (.862 = .75) can be accounted for by CRM ($p < .005$)**



C-5A CRM Process and Mission Performance Relationship





C-5A Study Results

- Each point represents one of 16 crews observed
- The dotted lines represent the minimum criterion for acceptable mission performance or CRM
- Most crews fell below minimum desired mission performance levels
- Crews given low CRM ratings consistently earned sub-standard mission performance ratings
- 33% of variability in mission performance ratings can be accounted for with CRM ratings ($p < .02$)



Summary and Conclusions

- CRM can be measured and analyzed when defined in terms of observable behaviors
- CRM and mission performance ratings highly related (33 - 75% of variance accounted for)
- Data patterns vary widely across platforms
- The specific behaviors that led to high or low CRM ratings were typically not covered in traditional Air Force CRM instruction



Impacts

- 58 SOW/CC funding a major overhaul of CRM training for MC-130P crews to apply research findings
- 512 AW/CC and 436 AW/CC changed C-5 operations based on study results
- Air Staff rewrote CRM training policy (AFI 11-290) to reflect initial research findings
- AETC/XP and AFRC/DO funded further CRM research
- The Navy has incorporated recommendations into their new CRM program plan
- The Navy is using these research data to justify CRM training budgets